

CLAIMS

1. A process for the contemporaneous preparation of middle distillates and lubricating bases starting from a feedstock comprising a mix of prevalently paraffinic hydrocarbons obtained by means of a synthesis process from hydrogen and carbon monoxide, consisting for at least 30%, preferably at least 50%, of a high-boiling fraction with a distillation temperature higher than 360°C, comprising:

(i) at least one hydrocracking step, wherein said hydrocarbon mix is reacted with hydrogen at a temperature of between 200 and 450°C and a pressure of between 0.5 and 15 MPa, in the presence of a catalyst, for a time sufficient for converting at least 40% of said high-boiling fraction, into a fraction of hydrocarbons which can be distilled at temperatures lower than 360°C;

(ii) at least one distillation step of the product of step (i) for separating at least a fraction of middle distillate and at least one high-boiling residue with an initial boiling point equal to or higher than 340°C,

characterized in that said hydrocracking step (i) is effected in the presence of a supported catalyst comprising:

(A) a support of an acidic nature consisting of a catalytically active porous solid, including silicon, aluminum, phosphorus and oxygen bonded to one another in such a way as to form a mixed amorphous solid forming a single phase, characterized by an Si/Al atomic ratio of between 15 and 250, a P/Al ratio of at least 0.1, but lower than 5, a total pore volume ranging from 0.5 to 2.0 ml/g, an average pore diameter ranging from 3 nm to 40 nm, and a specific surface area ranging from 200 to 1000 m²/g;

(B) at least one metal with a hydro-dehydrogenating activity selected from groups 6 to 10 of the periodic table of elements, dispersed on said support (A) in an amount of between 0.05 and 5% by weight with respect to the total weight of the catalyst.

2. The process according to claim 1, wherein said active support of the catalyst has a total pore volume of between 0.7 and 1.7 ml/g, a surface area of between 300 and 900 m²/g and an average pore diameter of between 5 and 30 nm, an Si/Al ratio ranging from 20 to 200 and a P/Al ratio ranging from 0.3 to 3.5.

3. The process according to any of claims 1 and 2, wherein the difference between 10% and 90% in the distribution curve of the pore dimensions of said active support of the catalyst, is included within a diameter

range of between 2 and 40 nm.

4. The process according to any of the previous claims, wherein said catalyst includes, in addition to said active support (A), preferably in a mix therewith, a binder consisting of an inert inorganic solid.
5. The process according to the previous claim 4, wherein said inert binder is selected from silica, alumina, clay, titanium oxide (TiO_2) or zirconium oxide (ZrO_2), boron oxide (B_2O_3) or mixtures thereof.
- 10 6. The process according to any of the previous claims 4 or 5, wherein said binder is in an amount of 1 to 70% by weight, preferably 20 to 50% by weight, with respect to the weight of said inert binder and said amorphous support (A).
- 15 7. The process according to any of the previous claims 4 to 6, wherein said catalyst is in the form of pellets having dimensions of around 2-5 mm in diameter and 2-10 mm in length.
- 20 8. The process according to any of the previous claims, wherein said metal in component (B) of the catalyst is selected from nickel, molybdenum, tungsten, cobalt, platinum, palladium and mixtures thereof, preferably platinum and palladium.
- 25 9. The process according to any of the previous claims, wherein the concentration of said metal having a hy-

dro-dehydrogenating activity ranges from 0.2 to 1% by weight with respect to the total weight of said catalyst.

10. The process according to any of the previous claims,
5 wherein said feeding mix comprises a synthesis product of the Fischer-Tropsch type.

11. The process according to any of the previous claims, wherein at least 80% by weight of said hydrocarbon mix consists of paraffins.

10 12. The process according to any of the previous claims, wherein said feeding mix consists for at least 80% by weight of linear paraffins having from 5 to 80 carbon atoms and an initial boiling point of between 45 and 675°C (by extrapolation).

15 13. The process according to any of the previous claims 1 to 11, wherein said feeding mix comprises from 40 to 80% by weight of a high-boiling fraction which can be distilled at temperatures $\geq 360^{\circ}\text{C}$ and from 20 to 60% by weight of middle distillate.

20 14. The process according to any of the previous claims 1 to 11, wherein said feeding mix has an initial boiling point of at least 260°C .

15. The process according to any of the previous claims, wherein said hydrocracking step (i) is run at a temperature of between 300 and 370°C and at a pressure of
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between 1 and 10 MPa, including the hydrogen pressure.

16. The process according to any of the previous claims,
wherein said hydrocracking step (i) is effected with
an initial (hydrogen)/(hydrocarbons) mass ratio of be-
tween 0.03 and 0.2.

17. The process according to any of the previous claims,
wherein the α conversion in said hydrocracking step
(i) ranges from 60 to 90%, preferably from 65 to 80%.

18. The process according to any of the previous claims,
wherein the high-boiling residue obtained in said step
(ii) includes at least 80% by weight of an isomerized
hydrocarbon mix.

19. The process according to any of the previous claims,
wherein an aliquot of said high-boiling residue ob-
tained in said step (ii) is recycled to the hy-
drocracking step (i).

20. The process according to any of the previous claims,
wherein said high-boiling residue used for the produc-
tion of lubricating bases is subjected to a dewaxing
treatment.

21. The process according to claim 20, wherein said dewax-
ing step consists of a catalytic dewaxing.

22. The process according to any of the previous claims,
comprising, in addition, a hydrogenating treatment of
the feed to said hydrocracking step (i).

23. The process according to any of the previous claims, wherein, before the hydrocracking step, a light fraction having a final boiling point lower than 380°C, preferably between 260 and 360°C, is separated from said feed, by distillation, before the hydrocracking step.
24. The process according to claim 23, wherein said light fraction is subjected to a hydro-isomerization treatment in the presence of a suitable bi-functional catalyst with a hydro dehydrogenating activity to obtain an isomerized mix.
25. The process according to claim 23, wherein said light fraction is subjected to a hydrogenating treatment, before the hydro-isomerization treatment.
26. The process according to any of the previous claims 23 to 25, wherein said light fraction or a product obtained therefrom, is joined to at least a part, preferably all, of said fraction of middle distillate obtained in step (ii) and sent to a fractionation step for the production of at least one fraction of middle distillate, preferably gas oil.